

TECHNICAL NOTE

The Environmental Symptoms Questionnaire: Corrected Computational Procedures for the Alertness Factor

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The Environmental Symptoms Questionnaire (ESQ) provides a systematic and quantitative measurement of acute mountain sickness (AMS) as well as other symptoms resulting from exposure to various climatic or stressful conditions. The questionnaire yields factor scores for nine distinct symptom groups. The computational procedures for one of the factors, Alertness, were incorrect as reported in the original manuscript (2). This paper gives the correct procedures and their rationale.

THE INCIDENCE and severity of symptoms of acute mountain sickness (AMS) can be systematically assessed with the Environmental Symptoms Questionnaire (ESQ), an instrument developed specifically for this purpose (1-3). The ESQ can also be used to evaluate symptoms resulting from exposure to other climatic and physical conditions (2-4). ESQ data have been factor-analyzed into nine distinct factor scores representing symptom clusters: Cerebral AMS, Respiratory AMS, Ear/Nose/Throat, Cold Stress, Distress, Alertness, Exertion Stress, Muscular Discomfort, and Fatigue. These factor scores were originally computed so as to fall within the scale range of 0 to 5 ("not at all" to "extreme"). Each factor score could, thus, produce interval-like values for parametric analysis (2).

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Human subjects participated in these studies after giving their free and informed voluntary consent. Investigators adhered to AR 70-25 and USAMRDC Regulation 70-25 on Use of Volunteers in Research.

Using the scoring procedures outlined in the original paper (2), we found that the alertness scores could assume negative values. Since these scores were not within the original scale range (0 to 5), they were not valid. In addition, the alertness factor could never attain a score of 5 (indicative of maximum alertness); this minimized the subjects' alertness scores and made them incomparable to the other factor scores. Thus, this paper describes a corrected procedure for calculating scores for alertness which do fall within the scale range and which are behaviorally more accurate.

METHODS

The leading items (highest weights) for the alertness factor are "feel alert" (item 66) and "feel good" (item 67). The algebraic signs of their weighting coefficients were erroneously listed as negative in Table II of the original paper (2, p. 1067) and should themselves be positive since they reflect levels of positive affective arousal rather than adverse symptomatology. Hence, the weights for these items should be +0.783 for "feel alert" and +0.787 for "feel good."

In addition, in order to avoid a negative score for the alertness factor as a whole and to simplify computation of this factor, we suggest that the other weights used in computing the alertness factor should be positive: +0.314 for item 56 ("feel tired"), +0.300 for item 57 ("feel sleepy"), +0.379 for item 58 ("couldn't sleep"), +0.351 for item 59 ("concentration off") and +0.300 for item 65 ("depressed"). However, this change requires that subject ratings for each item be recoded, since low subject ratings on these items (56-59 and 65) reflect decreased symptomatology (positive arousal) for the alertness factor. In other words, if the subject indicated a "0" on item 56 ("feel tired") this rating should be changed to a "5" since this value reflects more alertness. Specifically, the recoded ratings for each possible rating on an item by a subject are as follows:

| Subject's possible rating | Recoded Rating |
|---------------------------|----------------|
| 0 | 5 |
| 1 | 4 |
| 2 | 3 |
| 3 | 2 |
| 4 | 1 |
| 5 | 0 |

The new computational formula for the alertness factor is:

$$\text{Factor 6 (Alertness)} = (F6/16.07) \times 5$$

$$\text{where } F6 = (V56R \times .314) + (V57R \times .300) + (V58R \times .379) + (V59R \times .351) + (V65R \times .300) + (V66 \times .783) + (V67 \times .787).$$

NOTE: 1) V56R-V59R and V65R are the recoded ratings for each item; i.e., V56R is the recoded rating of Item 56 "feel tired," V57R is the recoded rating of Item 57 "feel sleepy," V58R is the recoded rating of Item 58 "couldn't sleep," V59R is the recoded rating of Item 59 "concentration off," and V65R is the recoded rating for Item 65 "depressed." 2) Values for V66 and V67 are not recoded. V66 is the rating for Item 66 "feel alert" and V67 is the rating for Item 67 "feel good." 3) The divisor in the computational formula has changed from the original value of 7.85 to 16.07 since the algebraic signs of the weights have been changed (2).

This new computational formula always yields a factor score between 0 and 5, the original scale values. In addition, it is behaviorally more accurate. For example, if a subject indicates "0" on items 56-59 and 65 and "5" on items 66-67 (responses indicative of maximum alertness), the alertness factor score will be 5. This calculated value indicates a subject with extreme alertness and is now comparable to the other factor scores.

In summary, these corrected computational procedures for the alertness factor are conceptually correct and should be more useful than the original ones. We recommend use of these procedures to calculate the value for the alertness factor whenever the ESQ is scored.

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